Amendments to the Claims

Please add new claims 21-35, and amend the remaining claims as follows:

1. (Currently Amended) A ~~decoding~~ system for ~~receiving and~~ decoding data ~~from an optical disk~~, comprising:

~~a demodulator for receiving and demodulating data from the disk to generate an ECC (Error Correction Code) block that comprises main data, a PI(Parity of Inner code), and a PO(Parity of Outer code);~~

a syndrome generator for generating a PI (Parity of Inner-code) direction syndrome and a PO (Parity of Outer-code) direction syndrome from an ECC (Error Correction Code) block comprising scrambled data, a PI, and a PO;

a memory that ~~connects with said syndrome generator to~~ stores ~~the data of said~~ PO direction syndrome during ~~said syndrome generator generating~~ generation of said PO direction syndrome;

a data buffer for storing said ~~main~~scrambled data from said ECC block, said PI direction syndrome and said PO direction syndrome; and

an ECC decoder for performing error correction decoding of said ~~ECC block~~scrambled data stored in said data buffer, using said PI direction syndrome and said PO direction syndrome.;

~~a de scrambler and EDC(Error Detection Code) check for de scrambling said main data stored in said data buffer and checking whether errors in said main data being corrected; and~~

~~an ATAPI(Advanced Technology Attachment Packet Interface) for reading said main data stored in said data buffer, then de scrambling and transmitting said main data to the host;~~

~~wherein both of said PI syndrome and said PO syndrome are generated before the ECC decoder performs the error correction decoding.~~

2. (Currently Amended) The ~~decoding~~ system as claimed in claim 1 further comprising a data room ~~that connects with said ECC decoder~~ to store said PI direction syndrome and said PO direction syndrome, wherein said ECC decoder accesses said PI direction syndrome and said PO direction syndrome from said data room for ensuing error correction decoding.

3. (Currently Amended) The ~~decoding~~ system as claimed in claim 2 wherein said syndrome generator reads said ECC block ~~from said demodulator, then~~ and transfers said ~~main~~scrambled data to said data buffer; ~~further~~and said ECC decoder reads said PI direction syndrome and said PO direction syndrome from said data buffer to said data room ~~to perform the error correction decoding, then corrects~~ and repeats ECC decoding by accessing and correcting said PI direction syndrome and said PO direction syndrome in said data room and ~~writes~~writing the corrected ~~part of said main~~scrambled data into said data buffer.

4. (Currently Amended) The ~~decoding~~ system as claimed in claim 1 ~~wherein said~~ further comprising a demodulator that receives and demodulates data from an optical disk to generate said ECC block and that converts M bit code words into N bit data symbols (M>N).

5. (Currently Amended) A ~~decoding~~ method for ~~receiving and~~ decoding data ~~from an optical disk~~, comprising the steps of:

(a) ~~transmitting the data from the disk to a demodulator, wherein said demodulator demodulates~~ demodulating the data to generate an ECC (Error Correction Code) block that comprises ~~main~~scrambled data, a PI (Parity of Inner-code), and a PO (Parity of Outer-code);

(b) ~~transmitting said ECC block to a syndrome generator and~~ writing said ~~main~~scrambled data into a data buffer;

(c) calculating a PI direction syndrome from said PI and a PO direction syndrome from said PO, and storing ~~the data of said~~ PO direction syndrome data in ~~to~~ a memory during calculating said PO direction syndrome;

(d) writing said PI direction syndrome and said PO direction syndrome into said data buffer;

(e) reading said PI and PO direction syndromes from said data buffer to an ECC decoder ~~and transmitting said PI syndrome to a data room~~ to perform ~~the~~ error correction decoding of the PI and PO directions;; and

(f) when errors are found, correcting said PI direction syndrome ~~in said data room;~~ and ~~correcting~~ said PO direction syndrome, ~~in said data buffer~~ and writing ~~the~~ corrected scrambled ~~part of said main data~~ into said data buffer.;

~~(g) writing said PO syndrome from said data buffer into said data room;~~

~~(h) reading said PO syndrome from said data room to said ECC decoder to perform the error correction decoding of the PO direction;~~

~~(i) correcting said PI syndrome and said PO syndrome stored in said data room, and writing the corrected part of said main data into said data buffer, wherein reading said PI syndrome and said PO syndrome to the ECC decoder are both performed before the ECC decoder performs the error detection decoding;~~

~~(j) reading said main data from said data buffer to a de scrambler and EDC check to de scramble said main data and check whether errors in said main data being corrected; and~~

~~(k) reading said main data from said data buffer to an ATAPI to de scramble said main data and transmit to the host.~~

6. (Currently Amended) The ~~decoding system~~ method as claimed in claim 5 ~~wherein said demodulator converts~~ further comprising converting M bit code words into N bit data symbols (M>N).

7. (Currently Amended) A ~~decoding~~ system for ~~receiving and decoding data from an optical disk~~, comprising:

~~a demodulator for receiving and demodulating data from the disk to generate an ECC (Error Correction Code) block that comprises main data, a PI(Parity of Inner code), and a PO(Parity of Outer code);~~

a syndrome generator for generating a PI direction syndrome from an ECC (Error Correction Code) block that comprises scrambled data, a PI (Parity of Inner-code), and a PO (Parity of Outer-code);

a data buffer for storing said ~~main~~scrambled data, said PI direction syndrome and said PO; and

an ECC decoder for performing ~~the~~ error correction decoding of said scrambled data, said PI direction syndrome and said PO~~ECC block;~~

~~a de-scrambler and EDC(Error Detection Code) check for de-scrambling said main data stored in said data buffer and checking whether errors in said main data being corrected; and~~

~~an ATAPI(Advanced Technology Attachment Packet Interface) for reading said main data stored in said data buffer, de-scrambling and transmitting said main data to the host;~~

~~wherein both of said PI syndrome and said PO syndrome are generated before the ECC decoder performs the error correction decoding~~.

8. (Currently Amended) The ~~decoding~~ system as claimed in claim 7 further comprising a memory that connects with said ECC decoder to store a PO direction syndrome ~~generated~~ calculated by said ECC decoder while performing PO direction error decoding.

9. (Currently Amended) The ~~decoding~~ system as claimed in claim 8 wherein said syndrome generator ~~reads said ECC block from said demodulator, then transfers~~ said ~~main~~scrambled data, said PO and said PI direction syndrome to said data buffer; ~~further~~ and said ECC decoder reads said ~~main~~scrambled data and said PO from said data buffer, ~~to~~ calculates said PO direction syndrome and performs ~~the~~ error correction decoding of the PO direction, then writes said PO direction syndrome into said memory, ~~and~~ corrects said PI direction syndrome ~~in said data buffer~~ and writes ~~the~~ corrected ~~part of said main~~scrambled data into said data buffer; ~~then reads said PI syndrome from said data buffer to perform the error correction of the PI direction, afterward corrects said PI syndrome in said data buffer and corrects said PO syndrome in said data room and writes the corrected part of said main data into said data buffer~~.

10. (Currently Amended) The ~~decoding~~ system as claimed in claim 7 ~~wherein said~~ further comprising a demodulator that receives and demodulates data from an optical disk to generate said ECC block and that converts M bit code words into N bit data symbols (M>N).

11. (Currently Amended) A ~~decoding~~ method for ~~receiving and~~ decoding data ~~from an optical disk~~, comprising the steps of:

(a) ~~transmitting the data from the disk to a demodulator, wherein said demodulator demodulates~~ demodulating the data to generate an ECC (Error Correction Code) block that comprises ~~main~~ scrambled data, a PI (Parity of Inner-code), and a PO (Parity of Outer-code);

(b) ~~transmitting said ECC block to a syndrome generator to calculate~~ calculating a PI direction syndrome;

(c) writing said PI direction syndrome, said ~~main~~ scrambled data and said PO into a data buffer;

(d) reading said ~~main~~ scrambled data and said PO from said data buffer to an ECC decoder to calculate a PO direction syndrome;

~~(e) writing said PO syndrome to a memory~~ and performing ~~the~~ error correction decoding of the PO direction;

(~~f~~e) when errors are found, correcting said PO direction syndrome ~~in said memory, correcting~~ and said PI direction syndrome, ~~in said data buffer~~ and writing ~~the~~ corrected ~~part of said main~~ scrambled data into said data buffer~~, wherein reading said PI syndrome and said PO syndrome to the ECC decoder are both performed before the ECC decoder performs the error detection decoding~~;

(~~g~~f) reading said PI direction syndrome from said data buffer to said ECC decoder to perform ~~the~~ error correction decoding of the PI direction; and

(~~h~~g) when errors are found, correcting said PO direction syndrome ~~in said memory, correcting~~ and said PI direction syndrome, ~~in said data buffer~~ and writing ~~the~~ corrected ~~part of said main~~ scrambled data into said data buffer;

~~(i) reading said main data from said data buffer to a de-scrambler and EDC check to de-scramble said main data and to check whether errors in said main data being corrected; and~~

~~(j) reading said main data from said data buffer to an ATAPI to de-scramble said main data and transmit to the host.~~

12. (Currently Amended) The ~~decoding system~~ method as claimed in claim 11 ~~wherein said demodulator converts~~ further comprising converting M bit code words into N bit data symbols (M>N).

13. (Currently Amended; previously allowed) A decoding system for receiving and decoding data from an optical disk, comprising:

a demodulator for receiving and demodulating data from the disk to generate an ECC (Error Correction Code) block that comprises main data, a PI (Parity of Inner-code), and a PO (Parity of Outer-code);

a syndrome generator for generating a PI syndrome;

a data buffer for storing said main data, said PI syndrome and said PO;

a first de-scrambler and EDC (Error Detection Code) check for de-scrambling said main data stored in said data buffer and checking ~~whether~~ for errors in said main data ~~being corrected~~;

an ECC decoder for performing ~~the~~ error correction decoding of said ECC block;

a memory that connects with said ECC decoder to store a PO syndrome;

a second de-scrambler and EDC check for de-scrambling said main data ~~which EDC checking is not finished yet~~ and ~~then~~ checking ~~again~~ whether errors in said main data ~~being~~ are corrected; and

an ATAPI (Advanced Technology Attachment Packet Interface) for reading said main data stored in said data buffer, then de-scrambling and transmitting said main data to ~~the~~ a host.

14. (Original; previously allowed) The decoding system as claimed in claim 13 wherein said syndrome generator reads said ECC block from said demodulator, then generates said PI syndrome and transfers said main data, said PO and said PI syndrome to said data buffer, meanwhile said main data is also transferred to said first de-scrambler and EDC check.

15. (Currently Amended; previously allowed) The decoding system as claimed in claim 13 wherein said ECC decoder reads said PI syndrome from said data buffer to perform the error correction decoding of the PI direction, ~~meanwhile~~ transfers ~~the~~ a detected error to said second de-scrambler and EDC check to get the EDC check of the PI direction, ~~then~~ corrects said PI syndrome and said PO in said data buffer, and writes ~~the~~ corrected ~~part of said~~ main data into said data buffer, afterward said ECC decoder reads said main data and said PO from said data buffer to generate said PO syndrome, ~~and~~ writes said PO syndrome into said memory to perform ~~the~~ error correction decoding of the PO direction, ~~then~~ corrects said PO syndrome in said memory and ~~corrects~~ said PI syndrome in said data buffer, ~~meanwhile~~ and rewrites ~~the~~ any further corrected ~~part of said~~ main data into said data buffer.

16. (Original; previously allowed) The decoding system as claimed in claim 13 wherein said demodulator converts M bit code words into N bit data symbols (M>N).

17. (Currently Amended; previously allowed) A decoding method for receiving and decoding data from an optical disk, comprising the steps of:

(a) transmitting the data from the disk to a demodulator, wherein said demodulator demodulates the data to generate an ECC (Error Correction Code) block that comprises main data, a PI (Parity of Inner-code), and a PO (Parity of Outer-code);

(b) transmitting said ECC block to a syndrome generator to calculate a PI syndrome;

(c) writing said PI syndrome, said main data and said PO into a data buffer, and transmitting said main data to a first de-scrambler and EDC check to de-scramble said main data and check whether errors in said main data ~~being~~ are corrected;

(d) reading said PI syndrome from said data buffer to an ECC decoder to perform ~~the~~ error correction decoding of the PI direction, and transmitting ~~the~~ any detected error to a second de-scrambler and EDC check to get the EDC check of the PI direction;

(e) correcting said PI syndrome and said PO in said data buffer and writing ~~the~~ PI corrected ~~part of said~~ main data into said data buffer;

(f) reading said main data and said PO from said data buffer to said ECC decoder to calculate a PO syndrome;

(g) writing said PO syndrome into a memory to perform ~~the~~ error correction decoding of the PO direction;

(h) correcting said PO syndrome in said memory and correcting said PI syndrome in said data buffer, and writing ~~the~~ PO corrected ~~part of said~~ main data into said data buffer;

(i) reading said main data from said data buffer to a second de-scrambler and EDC check to de-scramble said main data ~~which EDC checking is not finished yet~~ and to check again whether errors in said main data ~~being~~ are corrected; and

(j) reading said main data from said data buffer to an ATAPI to de-scramble said main data and transmit to the host.

18. (Currently Amended) The decoding method~~system~~ as claimed in claim 17 wherein ~~said demodulator converts~~ ECC block is generated by converting M bit code words into N bit data symbols (M>N).

19. (Currently Amended; previously allowed) The decoding method~~system~~ as claimed in claim 17 wherein said ECC decoder ~~can be~~ comprises a RSPC (Reed Solomon Product Code) structure.

20. (Currently Amended; previously allowed) The decoding method~~system~~ as claimed in claim 17 wherein said data buffer and said memory ~~include~~ are independently selected from the group consisting of EDO-RAM, SRAM, DRAM, SL-DRAM, DR-DRAM, EDO-DRAM, SDRAM, DDR-SDRAM, and VC-SDRAM~~, etc~~.

21. (New) The system as claimed in claim 1 wherein said data buffer receives (i) said scrambled data and said PI direction syndrome from said syndrome generator and (ii) said PO direction syndrome from said memory.

22. (New) The system as claimed in claim 1 further comprising a de-scrambler and EDC (Error Detection Code) check for de-scrambling said scrambled data stored in said data buffer and checking for errors in said scrambled data.

23. (New) The system as claimed in claim 1 further comprising an ATAPI (Advanced Technology Attachment Packet Interface) for reading said scrambled data stored in said data buffer, then de-scrambling and transmitting said scrambled data to a host.

24. (New) The method as claimed in claim 5 further comprising de-scrambling said scrambled data and checking for errors in said scrambled data.

25. (New) The method as claimed in claim 5 further comprising de-scrambling said scrambled data and transmitting said de-scrambled data to a host.

26. (New) The method as claimed in claim 5 further comprising abandoning said PI and said PO after said step of calculating said PI direction syndrome and said PO direction syndrome.

27. (New) The system as claimed in claim 7 further comprising a de-scrambler and EDC (Error Detection Code) check for de-scrambling said main data stored in said data buffer and checking for errors in said main data.

28. (New) The system as claimed in claim 7 further comprising an ATAPI (Advanced Technology Attachment Packet Interface) for reading said main data stored in said data buffer, de-scrambling and transmitting said main data to the host.

29. (New) The system as claimed in claim 7 wherein said ECC decoder reads said PI syndrome from said data buffer, performs error correction decoding of the PI direction, and when one or more errors are found, corrects said scrambled data and said PO in said data buffer.

30. (New) The system as claimed in claim 9 wherein said ECC decoder further reads said PI direction syndrome from said data buffer to perform the error correction of the PI direction, corrects said PI direction syndrome in said data buffer, corrects said PO direction syndrome in said data room, and writes the corrected scrambled data into said data buffer.

31. (New) The method as claimed in claim 11 further comprising de-scrambling said scrambled data and checking for errors in said scrambled data.

32. (New) The method as claimed in claim 11 further comprising de-scrambling said scrambled data and transmitting said de-scrambled data to a host.

33. (New) The method as claimed in claim 11 further comprising abandoning said PI after said step of calculating said PI direction syndrome.